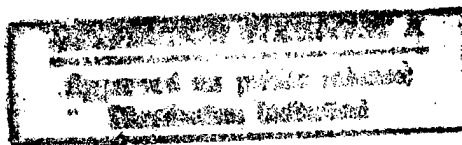


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# USSR Report

CONSTRUCTION AND RELATED INDUSTRIES

No. 92

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# USSR REPORT

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No. 92

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## CONSTRUCTION PLANNING AND ECONOMICS

### GOSSTROY DEPARTMENT HEAD OUTLINES MECHANIZATION PROGRAM

Moscow MEKHANIZATSIYA STROITEL'STVA in Russian No 2, Feb 83 pp 2-5

[Article by P. I. Moiseyev, head of the Gosstroy Department of Construction Mechanization: "One of the Central Problems of the National Economy"]

[Text] The Soviet people unanimously approved and is supporting the decisions and documents of the November (1982) Plenum of the CPSU Central Committee and the 7th Session of the Supreme Council of the USSR which confirms the indestructible unity between the Party and the people and their aspiration to advance firmly and unswervingly along the Lenin path.

In the keynote address which General Secretary of the CPSU Central Committee Yu. V. Andropov delivered to the Plenum, the ways to fulfill the decisions of the 26th Congress of the CPSU and the quotas for the Eleventh Five-Year Plan, to improve the well-being of the Soviet people and to strengthen the economic and defense might of our Motherland are disclosed thoroughly and in depth, a political and socio-economic evaluation of the State Plan for 1983 is given, and ways for overcoming the shortcomings and difficulties in developing the country's economy are pointed out:

Much has been done, and the successes are indisputable, but ahead lies intense and difficult work on the next problems of communist construction, upon the solutions to which the subsequent growth of our economy and improvement in the nation's well-being depend.

In this light, attention was drawn at the Plenum to the fact that plan quotas for the first two years of the five-year were unfulfilled according to a number of the leading indicators, and this, naturally, showed up on the draft of the plan for 1983. The course for increasing production efficiency, its intensification is still being slowly realized. Growth rates in labor productivity, the main indicator of production efficiency, do not meet modern requirements; the plans are being fulfilled at the cost of high expenses and production costs.

Work to improve all spheres of management of the economic system, administration, planning and the economic mechanism must be accelerated. It was said at the Plenum that it is necessary to create those economic and organizational conditions which might stimulate quality productive labor, initiative and

enterprise, with poor work and inactivity showing up in the most direct fashion on the material rewards, official status and moral authority of the workers. The Plenum required that responsibility for common state and national interests be intensified, that compartmentalization and the order of seniority be decisively uprooted and that no violation of party, state and labor discipline be tolerated.

Our country has at its disposal huge reserves and potential, the realization of which should be insured by a more efficient use of the achievements of scientific-technical progress and material and labor resources, by the widespread introduction of advanced experience with creative work and by the product relationship of each worker, of each laborer, to the national good.

Measures toward realization of the Foods Program and for the further development and improvement of the agro-industrial complex occupy a central place in the plans.

Certain main questions on the development of basic sectors of industry (the fuel and power complex, rail transport, ferrous metallurgy enterprises and capital construction) were also examined at the CPSU Central Committee Plenum.

Carrying out the large-scale tasks for the socio-economic development of the country is determined in many ways by the status of capital construction. The technical reoutfitting of practically all sectors of the national economy is realized through capital construction, and the achievements of scientific and technical progress are introduced. This is why bringing order to capital construction is one of the central national economic problems and there are more than a few problems there. We must still more decisively fight with the dissipation of efforts and resources over a multitude of projects. The organization of construction matters and work quality themselves are unsatisfactory in many respects. Certain of the construction ministries reduce the volume of building and installation work although considerable financial resources, machinery and equipment are directed toward strengthening the material and technical base of these ministries.

The most important tasks for all of the construction organizations are to improve matters in capital construction, to fulfill the plans for placing projects in service and to increase the quality and efficiency of capital construction.

The extent to which construction organizations are outfitted with industrial equipment improves both qualitatively and quantitatively from year to year. At present, the inventory of machinery and transport equipment in construction numbers more than 164,000 excavators, 43,000 scrapers, 160,000 bulldozers, more than 200,000 cranes of various kinds and a large number of other machinery, mechanized tools and other industrial equipment.

Hydraulic excavators equipped with diverse list of replaceable equipment, tower cranes with increased lifting capacity and automated installations for preparing concrete mixes and mortars, cement trucks, truck mounted concrete pumps, hole-drilling equipment, pneumatic loaders, powerful bulldozers, etc. are coming to be used more and more in construction.

In recent years, production of new types of construction and finishing machinery and mechanized building and installation tools has been developed by domestic industry: airless spray painting units, machinery for preparation and delivery of plaster mortar and mixes, electric hammers and perforators, impact wrenches, electric drills and screwdrivers with electronic speed control, building-installation [nail] guns, pneumatic punches, etc.

Much specialized truck transport equipment, various industrial equipment and small-scale mechanization equipment which reduce the cost of manual labor and materials greatly at construction projects are being manufactured through the efforts of building organizations at their own enterprises.

In just the years of the Tenth Five-Year Plan, the cost of the building machinery inventory grew from R 11 billion to R 18 billion. Now more than 90 percent of the primary labor-intensive building operations at construction projects are performed using machines. Twenty-five percent of those working in construction are engaged in handling machines and repairing it. The organization of productive labor for this category of workers influences the labor productivity for all the rest of the construction workers positively. Therefore, the further development of mechanization, the improvement of organization and technology for work and improvement in the use of building technology are some of the key trends for increasing labor productivity and improving the way building operations are carried out.

The plan for comprehensive mechanization and automation of building and installation operations for 1983, affirmed by Gosstroy USSR, poses precisely these problems before the construction ministries and departments. Fulfillment of the plan's quotas should be assured by improvement in the organization of building production management and by increasing the efficiency of production and work quality.

Quotas for construction ministries and departments to reduce the volumes of excavation and earth moving, handling, concrete, plastering and painting operations by 12-15 percent of the 1980 level, which will provide for a 32,000-man reduction in the number of workers employed in manual labor for these operations, have been established by the plan. The individual construction ministries and organizations of the union republics allowed a lag in fulfillment of this important quota in 1981 and the first half of 1982. The volume of manual labor for excavation and earth moving work increased in the first half of 1982, as compared with the first half of 1981, within organizations of USSR Minvodkhoz [Ministry of Land Reclamation and Water Resources] and USSR Minenergo [Ministry of Power and Electrification], for concrete work within organizations of USSR Minstroy [Ministry of Construction] and for plaster work within organizations of USSR Minsel'stroy [Ministry of Rural Construction], Mintransstroy [Ministry of Transport Construction] and others.

Not only does reduction of manual labor create conditions for increasing the efficiency and quality of work, it also makes work creative, interesting, i.e. there is a social aspect.

On the basis of a detailed registration done in 1983 of all heavy and manual operations, those jobs which it is advisable from an economic standpoint to mechanize or eliminate in the near future by improving planning and design decisions; by increasing plant preparation and the quality of parts and items which are delivered for use and by improving labor organizations and the technology for performing the jobs, as well as by using modern means for mechanization will be revealed.

A comprehensive program for reducing manual labor in the construction ministries, the realization of which should provide a sharp reduction in manual labor in construction, is being worked out on the basis of registration of building processes. This registration should be made by the engineering-technical services of each construction organization.

As calculations show, the number of workers in construction engaged in manual labor is slowly being reduced, and they constituted 49 percent of all persons working in 1979. On the basis of data from the 1979 estimate, the greatest share of workers engaged in manual labor in the construction organizations of USSR Minsel'stroy (59.3 percent) and USSR Minpromstroy Ministry of Industrial Construction (49.9 percent).

Practice shows that a significant reduction in manual labor is achieved through the efficient use of small-scale mechanization, given a concentration of building and finishing machinery and mechanized tools in the administrations (sectors) for small-scale mechanization, the creation of tool distribution points with a selection of the necessary tools at construction sites and teaching engineering-technical personnel and workers the efficient use of small-scale mechanization and tools. The experience of organizations of USSR Minenergo, USSR Ministroy, Glavmospromstroy Main Administration of the Moscow Municipal Council of Workers Delegates for Industrial Construction and others merits attention. This includes concentrating mechanized equipment within sectors and creation of specialized brigades and links to drill holes in reinforced concrete with diamond-tipped drills, driving through ground structures with pneumatic drifts, mounting hardware with blasting guns, water drawdown, waterproofing, concrete deaeration, painting structures with high pressure equipment, Gunitite spraying, etc.

High efficiency is provided when brigades are equipped with standardized complete sets. As a rule, such brigades work in accordance with the necessary technology, and they achieve a shift output per individual worker of 1.5-3 m<sup>3</sup> of laid stonework, install 3.4 m<sup>3</sup> of precast reinforced concrete, 20-22 m<sup>2</sup> of plastered surface and 30-35 m<sup>2</sup> of painted surface.

Increasing the extent to which brigades are equipped with the standard complete sets, given the efficient organization of tool services, will permit labor productivity to be increased in the individual job aspects by 15-20 percent, and it will insure the preservation and the continuous serviceability of small-scale mechanized equipment.



In recent years, the equipment list has expanded substantially, and delivery of mechanized tools and finishing machinery has been increased. With the aim of improving labor conditions and safety, more than 70 percent of all electric tools now are manufactured with double insulation. Output of impact tools which are vibration safe has been mastered: perforators, impact wrenches, drills and screwdrivers with electronic speed control. The production of plastering and painting stations, etc. has been started.

Highly productive high pressure units permitting work conditions for painters to be improved, the work quality to be increased and paint losses to be reduced are now being delivered to the builders in adequate quantities.

Given the appropriate technical training and organization of painting operations, the use of these units in the leading painter brigades of Glavmosoblstroy Main Administration for Construction in Moscow Oblast and Glavmospromstroy permitted the shift output of a single worker to increase to 500-600 m<sup>2</sup>; waste of painting materials was reduced by 30 percent in comparison with pneumatic sprayers. However, in a number of construction organizations, high pressure painting units are not adequately used. For example, during a check at "Yarneftekhimstroy" trust of USSR Minstroy, only 2 of 7 high pressure units were being used. The highly productive units are dispersed to small construction organizations which are in no shape to provide a full load and the corresponding work level, and the operating conditions and efficient use for them. The average output per worker when the units are used under such conditions does not exceed 30-70 m<sup>2</sup> per shift.

Now when the outfitting of construction with modern equipment is improving, the role of services which might provide proper serviceability through timely and competent maintenance is growing. However, many construction organizations are not devoting the necessary attention to creating the small-scale mechanization administrations which will be called upon to provide these functions.

The use of hydraulic excavators equipped with clamshell buckets, hydraulic hammers and special trimming buckets, drills (for drilling under the base of obstacles and for installing communications lines and electric transmission lines), various equipment for laying conduits, pipelines, watermains, under the roadways of streets, freeways and railroads without digging trenches is promoting a significant reduction in the volumes of excavation and earth moving operations done manually.

Having this type of equipment, construction organizations should not permit work to be done manually in trimming foundation pits and trenches, when pouring foundations and building supply and service lines when making excavations and trenches, doing vertical smoothing and compacting of soil, etc. These jobs should be entrusted to mechanization trusts (administration) and specialized organizations in which the proper earth moving equipment and specialists qualified in its operation are concentrated.

The experience of "Kamgesenergostroy" production association of USSR Minenergo in doing excavating and earth moving work using a continuous contract method, using constantly operating mechanized complexes on the basis of a broad unification of technological processes and job types merits attention. They achieved high indicators for the use of building equipment, and they reduced to a minimum, and in individual instances completely eliminated, the use of manual labor.

The established quotas for production of manual labor in contracting building organizations are given in the Table.

1. Работы	2. Объемы ручных работ на 1 млн. руб. СМР		3. Снижение объемов работ на 1 млн. руб. СМР в 1983 г. % к 1980 г.	
	4. 1980 г. (фактически)	5. 1983 г. (по плану)	6. по пяти-летнему плану	7. планируемое сокращение
8. Земляные, м <sup>3</sup>	1185,8	1004,3	13,5	15,3
9. Погрузка и разгрузка, т:				
10. нерудных материалов	184	157,3	14	15,5
11. строительных конструкций	132,4	110,6	—	16,5
12. цемента	78,1	64,3	13	17,1
13. Бетонные, м <sup>3</sup>	78	68,5	11,9	14,7
14. Штукатурные, м <sup>2</sup>	1672,8	1479,4	11,2	11,6
15. Малярные, м <sup>2</sup>	3800,8	3359,7	11,4	11,7

Key:

- |                                                                                                                 |                                                 |
|-----------------------------------------------------------------------------------------------------------------|-------------------------------------------------|
| (1) Operations                                                                                                  | (6) According to five-year plan                 |
| (2) Volumes of manual operations per million rubles of building and installation work                           | (7) Planned reduction                           |
| (3) Reduction in work volumes per million rubles in building and installation work in 1983 as a percent of 1980 | (8) Excavation and earth moving, m <sup>3</sup> |
| (4) 1980 (actual)                                                                                               | (9) Handling, tons;                             |
| (5) 1983 (according to the plan)                                                                                | (10) non- ore materials                         |
|                                                                                                                 | (11) Building structures                        |
|                                                                                                                 | (12) Cement                                     |
|                                                                                                                 | (13) Concrete, m <sup>3</sup>                   |
|                                                                                                                 | (14) Plastering, m <sup>2</sup>                 |
|                                                                                                                 | (15) Painting, m <sup>2</sup>                   |

It is planned to bring the mechanization level of roofing operations for a planned group of organizations to 58.5 percent on the average in 1983, as opposed to 49.8 percent in 1980.

It may be seen from the data which have been presented that the planned level for reducing the volumes of manual jobs exceeds the quota for the five-year plan for 1983 for all indicators. This is because in recent years the qualitative component of the building machinery inventory has been improving, the extent to which construction organizations have been equipped with small-scale mechanization and mechanized tools has increased, and their use has

improved as a result of expansion of the network of small-scale mechanization sectors and administrations.

The conversion of existing plants to automated preparation of concrete mixes and mortars, with transportation and concrete pouring being done using truck-mounted concrete pumps and mixers, will open significant possibilities for reducing labor costs and cement consumption and for increasing the quality of concrete work in 1983.

It is planned to bring the amount of concrete mixes prepared at automated plants and units to 101.3 million m<sup>3</sup> in 1983, with mortar coming to 21.9 million m<sup>3</sup>. This will permit the amount of automated preparation of concrete mixes to be increased in 1983 to 54.5 percent, and to 45.3 percent for mortar mixes (in 1980 they were 46.1 and 36.5 percent respectively).

Data under review for 1981 and the first half of 1982 show that a number of construction ministries and union republics are not providing for quotas for increasing the level of automation in the preparation of concrete mixes and mortars to be met; are not setting up the technical services within construction organizations and at enterprises of the construction industry devoted to set up and operation of automated concrete mixing unit control systems, and are not devoting the necessary attention to personnel training.

In the first half of 1982, a number of ministries did not provide for fulfillment of quotas for raising the level of automation in preparing concrete mixes. It is necessary to take decisive measures to fulfill this most important indicator of the plan in 1983, an indicator with great socio-economic significance.

In the last five-year plan, more than 30,000 road building machines with automatic control of the working component (road graders, asphalt layers, scrapers, ditching excavators) were manufactured and delivered to building organizations. Given their sufficiently high productivity and the ease of operation, these machines provided a savings in building materials and fuel, along with a simultaneous increase in work quality, during the development of rice paddies within USSR Minvodkhoz and during construction of roads within RSFSR Minavtodor [Ministry of Roads] and the Minavtodor of LaSSR. Thanks to the high precision with which the rice paddy areas were graded during development, this machinery produced an increased crop yield.

However, as tests show, in certain construction organizations, automated machinery is not being used as it was intended, the timely training of cadres of equipment operators was not organized and their mechanical status is being poorly monitored. In 1983 the possibilities of using automated machines should be exploited by all construction organizations.

One of the most important targets of the plan for 1983 is to improve the use of construction machinery. The duration of work time for the primary machines has not grown for a number of years, and it is now 10-12 hours/day, calculated on the basis of the average machine within a planned group. In the first half of 1982, a decrease in output and work time for a number of machines at

construction projects was tolerated by construction organizations of USSR Mintyazhstroy [Ministry of Construction of Heavy Industry Enterprises] Mintransstroy and USSR Minsel'stroy in comparison with the first half of 1981. Excavators and scrapers and crawler-mounted and pneumatic tire cranes are being used unsatisfactorily within organizations of USSR Minugleprom [Ministry of the Coal Industry] and this also applies to tower cranes within organizations of Minvostokstroy [Ministry of Construction in the Far East and Transbaykal Region] and others.

The low level of industrial training and production discipline for building and installation operations and the significant intrashift periods of machinery down time, constituting 16-18 percent according to data from selective checks made by the NIS [Scientific-research sector], are the main reason for unsatisfactory use of building equipment. About 70 percent of the lost machinery work time is the result of shortcomings in the organization of building production.

The presence of a significant number of worn machines, the lack of cadres of equipment operators, shortcomings in spare parts and mobile facilities for maintenance and repair also affected indicators for the use of building equipment. Worn machinery cannot give the required productivity because of greater than normal down time due to malfunction and reductions in capacity, and their operation and repair are associated with significant supplementary material and labor costs.

The main direction for improving organization of construction production and raising the level of equipment use should be to provide for quality engineering and technical preparation for construction, with the development of flow sheets and projections for carrying out operations and for determining within them the normal requirements for labor, material and equipment costs.

The participation of mechanization trusts and administrations in development and coordination of work production projections using machinery is provided for by the statute on the problems and functions of these organizations which was affirmed by Gassstroy in 1982 so that the calculations for the use of equipment was made on the basis of physical volumes achieved, or standard work time for the machinery. Such a system should be provided for by preparation of the work front and by delivery of the materials in complete sets. It presupposes an increased responsibility for the parties for observing the technology with which work is performed and the use of equipment.

Often, however, work at building sites is frequently done manually or in violation of the rules, even when the necessary mechanized equipment is available: top soil is not stripped away, the soil is not well compacted, drainage is not installed. This will make for extra costs in labor and material resources. Thus, even in construction of the harvester workshop at the model "Gosmel'mash" construction project, the earth work was done with serious violations of regulations.

In 1981 (as compared with 1980) throughout contract construction groups overall, the total length of time that single bucket excavators were in for all types of repair, waiting for repair decreased by 58,000 machine-days, bulldozers by 109, truck-mounted cranes by 23, pipelayers by 369 and truck-mounted loaders by 10,000 machine-days. The length of time that machinery (other than scrapers) was in for capital repair was also reduced (to 30 percent).

The enterprises of USSR Mintyazhstroy and Minneftegazstroy [Ministry of Construction of Petroleum and Gas Industry Enterprises] permitted the length of time machinery was in for repair to increase for practically all profiling machines. In many enterprises of the ministries and departments, it exceeded the normal time by a factor of 1.5-2.

The losses in machine work time due to failures are particularly great in the construction organizations and subdepartmental councils of ministries of the union republics, which have from 15-30 percent of the machinery inventory in construction. Thus, the length of time machines in operation within organizations and subdepartmental councils of ministries of the union republics were in repair or waiting on repairs is 11-27 percent greater than within organizations of the main construction administrations. This is explained by the fact that as a rule the equipment in the union republics is dispersed to small-scale construction organizations which do not have the necessary operating and repair centers and qualified cadres for their operation and repair. The dispersion also gives birth to further difficulties connected with spare parts supply, metal and completer items.

Assignments for centralization of the capital repairs of primary building machinery are not being fulfilled by a majority of the construction ministries, departments and organizations of the union republics, in spite of the significant reserves in the use enterprise repair facilities.

The performance of capital repair of basic machinery in significant volumes (28-38 percent) using the resources of the exploiting organizations in poorly equipped repair shops on a one by one basis is associated with increased costs for labor and time, and it disorganizes the primary work of the repair shops, that of planned preventive maintenance and servicing. Analysis shows that 75-80 percent of the total period that machinery is in for repair and waiting for repair falls to planned and unscheduled servicing which is done in repair shops at service bases.

About 70 percent of the workers engaged in maintenance and repair of building machinery still perform work manually.

Reduction in equipment down time due to repairs should be achieved by incorporating progressive technologies and devices for mechanizing repair work, and new methods for restoring worn parts and by developing a modular repair method.

With the aim of reducing equipment down time for repair and improving the technical level and quality of repair, quotas have been set for 1983 for

construction ministries and department with regard to the level of centralized centralized-plant capital repair of the most massive types of construction machinery and for incorporation of a comprehensive production quality control system at the repair enterprises. More than 70 percent of the number of overhaulable excavators, bulldozers, truck-mounted cranes, road graders, pipe layers and tractors will be repaired at the plants.

It must be noted that departmental separateness and unsatisfactory provision of spare parts and components shows up negatively on the level to which capital repair of construction machinery is specialized and the level of specialization at repair enterprises.

A comprehensive system of production quality control (CS PQC) is being introduced at enterprises for capital repair of construction equipment. In 1983 this system will encompass 53 more repair enterprises, and 40 plants are doing preliminary work for its incorporation. The efficiency of incorporating CS PQC is graphically visible from the example of the Vologda RMA mechanical repair plant, where the pool of machinery after repair was increased by a factor of 1.5-2 due to incorporation of more advanced technology and organization of repairs.

The plan for comprehensive mechanization and automation of construction and installation work for 1983 calls for quotas to improve the use of trucks, for intense development of progressive methods for organizing truck transport and for servicing rolling stock.

A 3.8 percent increment in the volume of freight transport is planned for 1983 (in comparison with that anticipated for 1982), and freight turnaround should increase by 5.1 percent. It is planned that about 63 percent of the volume of shipments should be realized by a centralized method, this figure being 3.2 percent higher than that anticipated for 1982. Conveyance of more than 350 million tons of building freight in truck trailers is anticipated by plan quotas. This figure is 56 percent more than expected for 1982. This will provide a significant fuel savings a reduction in the need for drivers.

The volume of containerized and packaged shipments of building freight will be increased by 38 percent, with the aim of increasing productivity, reducing manual labor and decreasing losses connected with handling and transport operations. About 60 percent of the brick and raw materials will be shipped using pallets and packages, 25 percent more than expected for 1982.

It is planned that 578 million tons of freight, or 42 percent more than anticipated for 1982, will be shipped using a brigade subcontract. One-sixth of the freight within contractor construction ministries will be shipped by this method. Increased quotas for the growth in the importance of ground work by all-around contracting brigades (43.4 percent, as opposed to 32.5 percent anticipated for 1982) have been set.

Shipment of concrete mixes and mortars according to an hourly traffic schedule will receive broad dissemination in 1983: thus, 150 million tons (40 percent) will be shipped, as opposed to 16 million tons in 1982. Shipment of more

than 328 million tons of building freight over previously worked out routes is called for, with the aim of reducing empty truck runs. The output of trucks will increase by 3 percent on the average.

The plan project calls for putting into service in 1983 87 diagnostic stations and fuel stops and mechanized truck washes (that reuse the water) to handle 16,500 trucks per day to increase the technical level of truck maintenance. Moreover, 82 flow lines for truck maintenance will be set up and put into operation, 17,500 slots for engine warm-up during the winter months will be outfitted and 6,225 specialized truck transport units will be manufactured. All this will promote a reduction in truck fuel, a decrease in environmental pollution and a number of workers at truck transport enterprises.

The way that quotas in the plan for comprehensive mechanization and automation of building and installation works for 1982 are being fulfilled points out that need for increasing the attention of construction ministries and departments to increasing the efficiency of mechanization work and using construction equipment as one of the most important factors for reducing manual labor and for radically improving building production.

It is necessary for ministries and departments and the Gosstroys of the union republics to control the totals for plan quota fulfillment systematically and to take measures to eliminate shortcomings in the organization of production and labor, and of the incorporation of advanced production methods and new equipment in to the practices of building production, keeping the following points in mind:

widespread introduction of new equipment for progressive resource conserving technologies such as the "wall in the ground," trenchless laying of water mains and conduits, airless application of paint, pipeline delivery of concrete mixes and mortars, drilling holes in concrete using diamond-tipped tools, mechanized application of waterproofing, doing jobs using pressure clamshell buckets and hydraulic hammers, etc.;

radical improvement in the technology and organization of building and installation work on the basis of strict observance of the requirements of plans for doing jobs, construction norms and regulations and increasing the responsibility of workers for carrying them out;

introduction of new mechanized equipment and methods for doing finishing work, equipping brigades with standard sets of equipment, tools, inventories and devices, and also reducing the work volumes by using wet processes;

accelerating the conversion of existing concrete mixing shops and plants to automated work;

development of containerized and packaged shipment of building freight and improvement in the organization for providing complete sets of industrial equipment and warehousing;

reduction of the importance of machinery with expired service lives and increase in the use of new machinery;

increasing the technical level of the repair-use depot for building machinery and small-scale mechanized equipment;

teaching workers and engineering and technical workers the use of the new high-production equipment and mechanized tools and the new industrial processes;

increasing the responsibility of engineering and technical services and specific workers for the efficient use of construction machinery and labor resources.

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## CONSTRUCTION PLANNING AND ECONOMICS

### GOSSTROY CONSIDERS PROPOSALS TO LIGHTEN BUILDING LOADS.

Moscow PLANOVOYE KHOZYAYSTVO in Russian No 3, Mar. 83 pp 127-128

/Recap of Glavstroynauka's opinion on reduction of building loads/

/Text/ Deputy chairman of the State Committee for Construction Affairs (Gosstroy) A.A.Borovoy has informed this journal that Gosstroy discussed the questions raised in V.G.Tolpygin's article "Reduction of building loads and economy of materials in construction" which was published by Planovoye Khozyaystvo in its No 12 issue, 1982. Also forwarded to our magazine was an official opinion on the question by the committee's Scientific Research Work and Introduction of New Technology MA (Glavstroynauka) which says the following:

The problem of reducing building loads is currently rated top priority. It is widely reflected in the composite plan for scientific and technological progress which spans a period of 20 years, it figures in all drafts for five year and annual plans as well as in normative documents relating to design and construction. However, the diminution of mass in buildings is neither the only nor the most important factor in lowering material expenditures, reducing construction time and increasing the effectivity of capital investment. The modification of normative acts to fuller reflect the durability properties of metals and the operational conditions for construction elements, the incorporation of advanced volume, layout and construction motifs for buildings and structures and, finally, the use of high-durability steel and precision-shaped rolled metal will all add up to a saving in 1985 of 2.4 million tons of steel against the figure for 1980.

In the process of drafting the State Plan for the economic and social development of the USSR in 1981-1985 Gosstroy tabled a broad spectrum of proposals aimed at reducing building and structure loads. On the basis of these proposals and considering the available resources the State Planning Committee (Gosplan) introduced a number of target figures into the 11th five-year plan

pertaining to the use of high-efficiency materials and finished goods by all ministries and departments. For example, in 1985 the consumption of highly rigid mineral-cotton slabs will increase 2.5-2.6 times over the 1980 figure, lightweight metal construction elements -- 2-2.2 times, shaped steel flooring -- 1.4-1.5 times, construction elements and finished goods out of autoclave cellular concrete -- 1.7-1.8 times.

Attaching great importance to monolithic reinforced concrete as a means of reducing building loads, Gosstroy in conjunction with Gosplan worked out a series of measures aimed at achieving wider use of monolithic reinforced concrete in industrial and housing construction. These measures are at present being implemented, and ministries and departments have been assigned individual target figures for 1981-1985. The research and design organizations of Gosstroy, the State Committee for Civil Construction and Architecture (Gosgrazhdanstroy), the Ministry of the Construction Materials Industry and several other ministries and departments are currently engaged in a program to further reduce the relative weight of fencing elements in buildings and structures by incorporating advanced materials into the construction process.

To lighten the weight of industrial buildings progressive volume, layout and construction patterns are being worked out and incorporated into production, such as decreasing the loads exerted by suspension and overhead bridge cranes, using light construction elements out of highly durable materials (concretes of the "600-800" type, high-durability steels), efficient lightweight materials, including light concrete, porous fillers, efficient insulating materials, lightweight fencing elements etc.

In housing and civil construction a gradual shift is in progress from single-ply keramzit panels to three-ply with a light material for the middle layer; the goal is to bring the new panels' share to 65-70%. This means that manufacturers will have to supply the construction industry with 1.6 million cubic meters of polystyrene foam plastic and 0.5 million cubic meters of rigid mineral-cotton slabs annually.

The frame design in public buildings is being replaced by large-panel structures as the more economical. This measure results in a saving of 4-7 kg of metal per sq. meter of overall area. Currently in active use are 17 standard projects for large-panel public buildings of the 1.220.1-2 class. In the production and use of brick and ceramic stone for housing construction the aim is to increase the volumes of efficient masonry elements. The proportion of efficiency brick in the overall production of building brick will grow from 22% in 1981 to 27% in 1985 and subsequently to 50%.

Acting to implement the tasks laid down by the 26th Congress of the CPSU in the matter of reducing metal consumption by the construction industry Gosstroy has specified the most promising areas of its utilization. These are regulated by the Technical Rules for the economical use of primary construction materials (TN -101-81).

The implementation of the above-listed measures is hampered by the inadequate provision of needed resources to capital construction projects. Because of an undersupply of raw materials the polystyrene foam-plastic manufacturing facilities of construction-related ministries and departments are working at 50% of capacity, highly rigid mineral cotton slabs - at 60%, phenol foam plastic (in the 9th and 10th five-year-plan periods) - at 11%. Moreover, there is a marked trend toward a further reduction in deliveries of polymer raw materials and products therefrom. Thus, shipments of polystyrene foam plastic to the construction industry totalled 500 thousand cubic meters in 1979, 334 thousand in 1980, 294 thousand in 1981, and the target figure for 1982 is 204 thousand cubic meters. The building industry was allotted 440 thousand cubic meters of fire-resistant foam plastic in 1975, 300 thousand in 1980, and for 1982 (based on the available resources of phenolformaldehyde resins) the level of consumption is set at 200 thousand cubic meters. Very little is being done to resolve the problem of supplying construction with components for the manufacture of foam polyurethane. As a result the three-ply and monoslab producing plants of the Ministries of Heavy and Transport Machine Building (Mintyazhmash), Installation and Special Construction (Minmontazhspetsstroy) and Power and Electrification (Minenergo) are working with imported raw materials and because of their scarcity are operating at only 40% of capacity.

The use of light fencing elements entails an accompanying need for compacting washers and hermeticals. Plans for the construction of facilities to produce these materials and goods are not being fulfilled. Also not being carried out in full are assignments covering deliveries of efficient shaped stock and shaped zinc-coated sheeting as well as high and very high durability steels. The Ministries of the Chemical Industry (Minkhimprom), Chemical and Petroleum Machine Building (Minkhimmash), the Petroleum Refining and Petrochemical Industry (Minneftekhimprom) and Ferrous Metallurgy (Minchermet) must undertake measures to create facilities for the production of efficient polymer insulating and hermetizing materials, shaped flooring, curved profiles, etc. This will be of great help in solving the problem of shortening the duration of the building cycle and reducing the load of buildings currently under construction.

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## INDUSTRIAL CONSTRUCTION

### GOSPLAN SPECIALIST RELATES UNIT BLOCK CONSTRUCTION EXPERIENCE

Moscow PLANOVOYE KHOZYAYSTVO in Russian No. 3, Mar 83, pp 97-100

[Article by V. Sollogub, chief specialist for USSR Gosplan: "Experience in Using the Completely Modular Method of Construction"]

[Text] The deficiencies in capital construction, in particular in organizing construction affairs, were pointed out at the November (1982) Plenum of the CPSU Central Committee. Special attention was given in the plenum's decree to the necessity of substantially improving capital construction in all sectors of the national economy. The industrialization of construction, including overall work to increase the prefabrication of structural components and the modular nature of technological equipment, mechanizing construction and installation work, improving technology and organizing and managing construction are attaining important significance for the gas industry which is characterized by high rates of growth and also by a high consumption of capital. The completely modular method of construction has been adopted in the sector since the middle sixties. It began to be especially extensively used at the end of the 9th and 10th Five-Year Plans during the development of gas deposits and the construction of compressor stations. This was aided to a substantial degree by long-range programs (adopted in 1974-1975) for the technical reoutfitting of structures with new highly efficient modular technological equipment and for increasing industrialization and mechanizing construction. For this production structures are completely manufactured at rear bases in plant shops and then the modular sections are transported to the site and installed. Such a method increases labor productivity by a factor of four.

Modular sections are also extensively used for constructing housing, administrative, and auxiliary production premises in the systems under the Ministry of Transport Construction, the USSR Ministry of Energy and the USSR Ministry of Installation and Special Construction.

Up to the present time scientific research, design and structural organizations in the Ministry of the Gas Industry, the Ministry of Construction of Petroleum and Gas Industry Enterprises and the Ministry of Chemical and Petroleum Machine Building have worked out more than 300 types of completely modular installations for production and auxiliary purposes. For gas works there are completely modular technological equipment for installations that completely process gas (UKPG) which have an individual capacity of 5 million cubic meters of gas per 24 hours (22 types of technological modular sections), pumping stations for repumping liquid products, a compressor station for compressed air, a distributing installation for 380/220B voltage and other installations (from 10 to 50 completely modular installations, not counting the modular sections of the technological equipment are used at one UKPG

depending on the rate of producing and the plan for developing the gas). For gas pipelines there are several types of gas pumping units, devices for cooling the gas by air, dispatcher and pumping stations, electric panel, operator and service premises, etc. Up to 40 completely modular installations are used at one compressor station. Their adoption in building structures for the gas industry is continuously increasing: in 1974--260 units were installed, in 1976--1810, in 1978--4,120, in 1980--5,010 units.

Scientific research and structural design organizations in the Ministry of Energy, the Ministry of Construction of Petroleum and Gas Industry Enterprises, the Ministry of Chemical and Petroleum Machine Building and the Ministry of Instrument Making, Automation Equipment, and Control Systems, have done much work to standardize and unify technical and structural approaches. The number of characteristic parameters for developing gas and gas condensates has been limited. The use of typical technological schemes, a typical makeup for the completely modular automated complex, technological installations and lines, and standard component approaches for placing equipment along with the availability of a catalog of modular equipment with a minimal but sufficient number of size types has provided a reduction in the time for working out the technological portion of the projects. The most typical projects where the measures listed were implemented are the Shatlyk and Naip deposits in Central Asia and Medvezh'ye in north Tyumenskaya oblast.

The adoption of new modular technological equipment has made it possible to increase the individual capacity of an installation by a factor of 1.7 in comparison with those used previously and to substantially reduce capital expenses. Where the cost of building a UKPG 1.2 at the Naip gas condensation deposits amounted to 4.75 and 3.98 million rubles, respectively, a UKPG 3.4, with the same productivity but having modular sections with a throughput capacity of 5 million cubic meters per 24 hours, amounted to up to 2.1 million rubles. Capital expenses were reduced by means of adopting technological equipment with improved productivity at the Shatlyk and Gugurtlin deposits. Calculations that were made by the VNIPI [All-Union Scientific Research and Design Institute] for Gas Deposits and the VNIIE [All-Union Scientific Research of Electric Power Engineering] for the Gas Industry have shown that with the use of technological modular sections having an individual productivity of 5 million cubic meters per 24 hours capital investments are reduced (by a factor of 1.8 to 2.3) as well as the space occupied (by a factor of 2) and operational expenses in comparison with technological modular sections having a productivity of 1 million cubic meters.

There are absolutely no buildings or structures erected in the traditional manner at the UKPG of the Shatlyk and Naip works. As a result of the use of technological modular sections and completely modular installations labor expenses for developing these deposits were reduced by a factor of 2, labor productivity improved by 10 to 15 percent and the time of construction was reduced by a factor of 1.5 to 2. Due to the start up ahead of schedule and the obtainment of additional quantities of gas at the UKPG-1 of the Naip deposits a significant economic effect was derived--800,000 rubles. The design for developing these deposits with the aid of completely modular installations and technological modular sectors was awarded a degree I Diploma by a resolution of USSR Gosstroy. The use of the above mentioned installations also proved effective at other works.

When designing compressor stations in a completely modular fashion, however, a complex approach is lacking in a number of cases which is inherent in developing gas works. To a lesser degree the adoption of completely modular installations at compressor stations is accompanied by an improvement in the technological equipment with the aim of increasing its productivity, the degree of its modular nature and its automation. The Ministry of Power Machine Building is especially lagging behind in this regard. The creation and adoption of gas pumping units with a capacity of 16,000 and 25,000 kilowatts was carried over from the 10th to the 11th Five-Year Plan.

During the 10th Five-Year Plan gas pumping units with aviation and ship-type drives made in a completely modular fashion were adopted at compressor stations. Their use with the aviation-type drive was especially efficient which makes it possible to not build a compressor shop building. The units are assembled at the plant together with all the accompanying systems, they are installed on a support slab and placed in containers. As a result a substantial savings in labor and material resources is achieved and the time of construction is reduced. The use of the units in comparison with the GT-760-6 having practically the same capacity provided a reduction in labor expenses (and the corresponding times of installation) from 3975.7 to 670.36 manhours, i.e. by a factor of 5.9. Along with this the high quality of operation of the unit itself is guaranteed since the assembly was done under plant conditions, and the demand for materials and special tools, the need for qualified specialists and expenses for wages are reduced.

Meeting the planned goals for producing gas pumping units during the 11th Five-Year Plan will make it possible to increase the relative proportion of those made in a modular or completely modular fashion. Auxiliary structures for compressor stations were located as a rule during the 10th Five-Year Plan in modular boxes or in buildings that were completely put together at the factory. Substitution of the traditional brick or panel building with a modular box makes it possible to reduce the consumption of labor at the construction site during its installation by a factor of 2; the time of installation by a factor of 1.5 to 1.7; the total consumption of materials for the structure by a factor of 2 to 3; the number of workers (on the average) at the construction site by more than a factor of 2; and transportation expenses by 20 percent.

The organizational and technological reliability of compressor station structures, as an analysis has shown, is improving, i.e. the proportion of those built within the standard time schedule or less is increasing. It amounted to 75 percent by the end of the 10th Five-Year Plan in comparison with 60 percent during the 9th and beginning of the 10th Five-Year Plans. With a good organization of labor and complete equipment the time of construction for completely modular stations is realistically reduced by 4 to 5 months. This made it possible to reduce the standard time of construction for compressor stations with aviation-type units by 20 percent.

On the whole the adoption of the completely modular method of construction proved to have a significant effect on the pace of building structures for the gas industry and on increasing (by 50%) the extraction of gas during the 10th Five-Year Plan. The party and government valued the work that was done very highly. In 1980 the group that directly developed the method was awarded the Lenin Prize.

At the same time, deficiencies still exist in building compressor stations when the adoption of completely modular auxiliary structures was not accompanied by a corresponding improvement in the basic technological equipment. The use of modular boxes leads, as a rule, to an increase in the total estimated cost of compressor stations, the consumption of metal, a length of utility lines and a reduction in the density of the structures.

At the present time the cost of building a compressor shop (determined completely by the use of basic technological equipment) makes up 25 to 50 percent of the summary estimate for compressor stations while auxiliary structures (suitable for being placed in modular boxes and SKZ [expansion unknown] comprise 15 to 25 percent, and laying utility lines and site work are 25 to 30 percent. Thus, the adoption of modular auxiliary compressor structures at compressor stations cannot radically change the construction indicators. During the 10th Five-Year Plan about 50 percent of the stations that were built were provided with the traditional gas pumping units that are supplied with individual assemblies and parts.

The technical and economic indicators for the modular boxes and buildings that are formed from them which are manufactured by the Ministry of the Gas Industry and the Ministry of Construction of Petroleum and Gas Industry Enterprises are not distinguished as being at a high level. The cost of one square meter of space in the premises that are completed according to these variations is greater by a factor of 2 to 3 than the cost of a traditional building while the consumption of metal per one cubic meter of the premises is greater by a factor of 2.5 to 3. In addition, their present structure is provided with a rigid large-scale scheme (a 30 to 36 square meter unit) which in a number of cases leads to an unjustified expansion in the area needed to install the equipment. The estimated cost and consumption of metal for the compressor stations correspondingly increase. The effect of reducing labor consumption at the construction site is not always used to the full degree. During the 9th and 10th Five-Year Plans the delivery of equipment was, as a rule, made by the client and not the plant-manufacturer and not on time either. The completeness of the modular structures, thus, was not adhered to and the installation of equipment proceeded under crowded conditions at the construction site which brought about a lengthening of the installation schedules and increased the demand for labor resources.

An important goal in improving the effectiveness of capital investments is to improve their technological structure which is determined by the relationship between expenses for equipment and for forming the buildings and structures that provide the conditions for a normally functioning project. Over the last few years a noticeable increase in the proportion of equipment has occurred at gas industry projects due to a reduction in the proportion of construction and installation work; however, this ratio is still lower than for production construction in the country as a whole. An analysis of the estimate documentation for compressor stations and for laying out works has shown that the use of modular boxes and the complete buildings that are formed from them increases the specific estimated cost and the proportion of construction and installation work and reduces the proportion of equipment in the total estimated cost; the use of modular equipment leads to opposite results. This is caused by the high cost of completely modular installations and the low level with which they are saturated with equipment in association with a lack of special standards for service zones and with deficiencies

in determining the estimated cost of projects made in a completely modular fashion. When calculating the estimated cost they proceed from the proposition by which the cost of the foundation and the enclosure components along with extra charges for overhead expenses, a portion of the cost of temporary buildings and structures and also other work and expenses become part of the total SMR [construction and installation work]. When plants manufacture and totally deliver completely modular installations this is incorrectly represented. If one excludes expenses for temporary buildings and structures, other work and expenses its specific estimated cost (per 1 kilowatt) is reduced by 1 to 1.2 percent and the proportion of construction and installation work by 0.4 to 0.6 percent. If one attributes the entire cost of this work to the category of "Acquiring equipment" then the specific estimated cost is reduced by 3 to 5 percent, and the amount of construction and installation work by 10 to 12 percent. Consequently potentials for reducing construction expenses are contained in the very approach to determining the estimated cost while simultaneously improving the technological structure of capital investments.

Expense Items	"Sibkomplektmontazh" (Tyumen') in the Ministry of Construction of Petroleum and Gas Industry Enterprises	"Tulamashgaz" in the Ministry of the Gas Industry	The October Metal Components Plant in the Ministry of Construction of Petroleum and Gas Industry Enterprises	The Structural Components Combine (Serpukhov) in the Ministry of Construction of Petroleum and Gas Industry Enterprises
Cost	340	185	324	155
In Particular:				
Materials	117	80	112	102
Wages	60	29	38	11
Expenses:				
Shop	84	13	58	10
General Plant	63	28	36	11

The primary trends in improving the completely modular method of construction for gas industry projects are increasing capacity, miniaturization, modular manufactured equipment that is suitable to be installed in the open (without facilities) and substantially increasing reliability and automation. The last factor affects the number of service personnel, the size of the area for the auxiliary premises and the volume of construction. The new technical decisions worked out by the Ministry of the Gas Industry in 1980 and 1981 still do not specify a fundamental reduction in the number of service personnel. It is possible to increase the density of



structures by means of more fully utilizing the new reduced fire prevention distances between buildings and structures that were adopted in the Instructions for the Structural Design of Enterprises, Buildings and Structures for the Oil and Gas Industry (SN [construction standards] 433-79). It is necessary, in our view, to expand the use of laying heating networks without conduits, bituminous perlite insulation and the laying of utility lines on piers. The use of piers instead of conduits makes it possible to reduce the cost of utility work by 32 percent, the consumption of labor for earthwork by 60 percent and the consumption of monolithic and precast reinforced concrete by 6 percent. In addition, servicing the utilities is simplified. There are also significant potentials in improving the economic indicators for completely modular installations which is evident from the data in the table.

The "Tulamashgaz" plant's modular boxes have the lowest cost. The labor expenses for manufacturing them here were reduced from 4,193 to 2,010 manhours between 1975 and 1978. On the other hand, the cost of manufacturing modular boxes and the complete buildings that are formed from them depend on the mass and unit cost of the materials used, the structure of the technological processes for making them, the expenses to prepare for production, the makeup of the equipment, etc. Proceeding from this is order to reduce the cost of completely modular installations it is necessary, in our opinion, to reduce the consumption of materials, increase the degree of serial production, improve the standardization of assemblies and parts and to improve the technology of production by means of introducing mechanized and automated flow lines.

Other ways of improving the completely modular method of construction are possible, in particular:

by standardizing and typifying designs;

by reducing the mass of the completely modular installations which affects the cost during production, transporting and assembly and as a result during the operation of the project. The point being made is about a specific completely modular installation that is suitable for assembly. This method does not have to be combined with enlarging modular sections and completely modular installations with the aim of completing a construction complex (compressor station, works, plant) with a minimum number of super-modular sections (when its purpose and equipment has been determined it is also desirable to keep its mass to a minimum);

by improving the level of factory preparedness of the completely modular installations;

by creating special mechanisms that prevent damage to the installations during their transporting and installation which are designed with the required load-lifting capacity;

by improving the level of automation and autonomy of the completely modular installations.

In order to realize these trends it seems expedient, first of all, to improve the production level of completely modular installations, to determine the plant

manufacturers and to charge them with the obligation of making a complete set of equipment for the installations. The appropriate output control is also needed. A reevaluation of the modular box components and the complete buildings that are formed from them is also needed, in our view.

Spatial components (modular boxes) that have an improved structure are used in a number of other sectors of the national economy. For example, framework braces from 80 X 80 X 4 closed shapes and floor and roof panels are manufactured from welded horizontal frames (pipes with a square cross-section of 125 X 125 X 4). By this means labor expenses are reduced by 30 to 35 percent, the cost by 15 to 20 percent, and the mass of the structural components by a factor of 3 to 5.

The trends mentioned for improving the method that was reviewed were partially realized at the end of the 10th Five-Year Plan and at the beginning of the 11th. In 1980 a resolution was adopted to include the manufacturing of completely modular installations in the national economic plan.

In the final analysis the implementation of this resolution will make it possible to improve the effectiveness of capital investments.

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## AGRICULTURAL CONSTRUCTION

### FINANCING, CONSTRUCTION OF RURAL HOUSING DISCUSSED

#### Housing Construction Loans for Rural Areas

Moscow SEL'SKAYA GAZETA in Russian 10 Mar 83 p 2

[Article by V. Varvashenya, chief of the Administration of Credit for Kolkhozes and Individual Borrowers of the Belorussian republic office of Gosbank:  
"From the State -- For a Rural Resident"/

[Text/ The social policies of the CPSU are aimed at overcoming the differences between the municipal and rural populations in accordance with the nature of their housing and domestic conditions. Thus the construction in the rural areas of modern housing which combines municipal conveniences with the characteristics and peculiarities of rural life is being encouraged.

Important measures for increasing the housing fund were defined in the decree of the USSR Council of Ministers entitled "Private Housing Construction." This decree obligates the sovkhozes and other state agricultural enterprises (and kolkhozes in the form of an recommendation) to carry out the construction of private housing with the builders for agricultural workers.

Privileges have been established for agricultural workers with regard to paying for the cost of construction of well organized private dwellings of the farmstead type. The initial payment of funds is made once the home is occupied in the amount of 20 percent of the estimated cost of construction. The farm leaders, by agreement with the professional trade union organizations, can lower the amount of the initial payment to 10 percent for persons discharged from active military service, newlyweds and young specialists, and on farms experiencing an acute shortage of manpower, for workers in the mass professions who have converted over to permanent work at these farms. The institutes of USSR Gosbank can extend credit in the amount of the estimated cost for the construction of private dwellings with outbuildings in the rural areas to kolkhozes, sovkhozes and other state agricultural enterprises and organizations of consumer cooperation.

The farms pay an annual interest rate of 0.5 percent for the use of credit and for overdue loans -- 3 percent annual interest for the period that the loan is overdue.

The repayment of this credit is carried out over a period of 20 years following completion of construction of a dwelling. In the process, one half of the total amount of the credit is repaid by the sovkhozes and other state agricultural enterprises and organizations of consumer cooperation using resources from the economic incentive fund. The repayment of the remaining portion is carried out by the farm workers on a monthly basis in equal amounts.

Such a system for the repayment of credit is recommended for use by the kolkhozes.

This decree increases the amount of credit that can be extended to builders, it lengthens the period of use of the credit and it also calls for the issuing of a new type of credit for the capital repair of dwellings, for connecting them up to water and sewerage networks and for expenses associated with supplying gas to private dwellings in the rural areas.

Today credit for the construction of private dwellings with outbuildings is made available to builders in amounts up to 3,000 rubles, with repayment to be made within a period of 10 years, commencing with the fifth year following the completion of construction of a dwelling.

Credit is extended on favorable terms to certain categories of citizens.

Credit for the capital repair of private dwellings with outbuildings and for connecting them up to water and sewerage networks is extended in amounts up to 500 rubles, with repayment to be carried out within a period of 5 years following completion of the work and for expenses associated with supplying gas to private dwellings -- in amounts up to 200 rubles per home (apartment), with repayment to be completed within 3 years following completion of the work. All of this work must be carried out by the borrowers within a period of 6 months following the day on which the loan was obtained.

Builders who perform at cost accounting enterprises, institutes and organizations, kolkhozes and sovkhozes are extended credit through these organizations and enterprises in accordance with their obligations; builders who work at budgetary institutes and organizations -- by petitions submitted by these organizations in behalf of the personal obligations of the borrowers.

For the use of credit, a borrower pays the bank 2 percent annual interest and for overdue loans -- 3 percent annual interest for the period of time that the loan is overdue.

USSR Gosbank also extends credit as follows:

- to rural housing-construction cooperatives;
- to citizens who transfer from farmsteads and small populated points, for the construction of dwellings;
- to kolkhoz members and manual and office workers residing in the rural areas and suburban zones who do not have cows, for purchasing cows and heifers;

-- to manual and office workers, members of horticultural associations, for procuring or building gardening structures and for improving their gardening tracts;

-- to young specialists who have completed programs of study at higher and secondary specialized educational institutes and who have been sent to work in the rural areas, for acquiring farm materials.

During 1982, the republic's institutes of Gosbank issued more than 4 million rubles worth of credit to individual borrowers for all types of measures and this had a positive effect with regard to expanding the construction of private dwellings and also on the development of the private plots.

#### Cooperative Housing in Rural Areas

Moscow STROITEL'NAYA GAZETA in Russian 20 Feb 83 p 3

Article by O. Pakhomova: "House By the Side of the Road"

Text 1. A Rural ZhSK housing construction cooperative: A Plan and an Estimate.

Discussions on the need for organizing rural housing-cooperative construction on an extensive scale have been underway for some time. And they have been similar to squalls. For a period of time, everything remains calm. Half-forgotten speeches and resolutions engender a soothing effect. But suddenly storm winds develop in the form of the next campaign and heated discussions arise. Recommendations are made in haste. But thereafter the sun finally breaks through, the excitement abates and the ear is flattered by a friendly breeze bearing reports and resolutions: "The construction of cooperative dwellings in the rural areas must be developed" -- once again, very few pay attention.

Many maintain that they have no time for it, despite the fact that today everybody is aware that the erection of housing using only state resources is unprofitable. And here is why. Owing merely to an increase in the proportion of farmsteads in the overall construction volume and also the erection of farm buildings, the average cost per square meter of overall housing space in 1980 was 198.5 rubles compared to 186.6 rubls in 1975. According to estimates by USSR Gosplan and Gosstroy, by the end of the present five-year plan, owing to improvements in the comfort level, the cost for a rural dwelling will be raised by another 11.3 percent.

We are quite properly proud of the scales of state construction in the country's rural areas. The party and government hold this up as their goal, as they strive to bring the living conditions of rural and city workers closer together and achieve greater retention of rural personnel at their posts. Thus the plans for this current five-year plan in the rural areas call for the placing in operation of 176 million square meters of living space. This is 30 million more than during the previous five-year period. And the resources of private builders, the income of which is increasing from year to year, can provide substantial assistance in carrying out such a tense social program.

What is the picture at the present time?

Over the past 12 years, the scale of private construction in the rural areas has decreased by almost one half. Naturally, this has led to a situation wherein the erection of housing using the resources of the population has constituted an insignificantly small portion of the country's national product. Yes and of the overall volume of cooperative housing placed in operation each year, rural homes constitute an extremely small proportion. Last year, for example, only approximately 8 percent. And this occurred despite the fact that recent decrees called for a mass of privileges to be extended to those who build homes using their own money.

If the geography of the experience accumulated in rural housing-cooperative construction was plotted on a map of the country, then we would see only isolated "small islands": Lithuania, Uzbekistan, Moscow Oblast. A strange picture -- for some perhaps and for others -- no. Why?

Two years ago I happened to be visiting the Lithuanian SSR and the newspaper at that time was discussing in detail the successes achieved by this republic. Each year, 6,000-7,000 rural dwellings are being built there using resources of the population. And not just any type of dwelling, but farmsteads: 99 percent -- single apartment facilities and the remainder -- for two families. Each year the rural residents invest roughly 100 million rubles in private and cooperative construction. Over a period of 12 years, approximately 650 rural ZhSK's have been created in the republic. Compared to the all-union level, the situation here resembles an overturned pyramid: even during the Ninth Five-Year Plan, private builders accounted for 79 percent of the housing. Roughly the same indicators prevailed during the past five-year plan.

You will no doubt agree that stable results achieved during the past two five-year plans were not just a random happening. The secret was a simple one: the republic's Council of Ministers annually approve a plan for private and cooperative construction based upon a summary of requests submitted by private builders. Minsel'khoz /Ministry of Agriculture/ is responsible for the fulfillment of this plan.

Unfortunately, neither Gosgrazhdanstroy /State Civil Construction/, USSR Gosplan nor any other union organization has drawn the proper conclusions regarding operational results in Lithuania or the other republics. Leading experience, which over a period of many years has proved the vitality of the idea and its economic advantages, is still not being employed in all areas.

This is unfortunate. Valuable time has been lost. In the face of mass organization of rural housing-cooperative construction, the state resources made available could have been used for other purposes. For example, for raising the comfort level of the housing, for erecting additional social and cultural installations and for providing engineering support for settlements.

But why was the fine experience not adopted and why was the rural cooperative home left at the side of the road?

There were many who maintained that this undertaking had too many opponents. Others seconded their opinion by insisting that there simply were not enough enthusiasts.

But the principal reason was to be found elsewhere: in the conflict which existed between the strategic and tactical goals on the whole.

At the present time, the construction volumes for cooperative housing, including rural housing, are not being approved in the plan but rather are being defined based upon computations. Yes the government has obligated USSR Gosplan to examine the draft state plans for capital investment limits, contractual operations and material-technical resources for the erection of dwellings for private clients. But the solution for this problem has still not been carried out. The plan for this year makes no provision for limits or resources.

True, it was not too long ago that USSR Gosplan defined the system for planning private construction, including the allocation of limits for capital investments, construction-installation and contractual operations and providing them with material-technical resources. However, this decision does not affect the rural ZhSK's.

And if there is no program, then how can we possibly speak of planned and progressive development for cooperative housing construction? Who can be held accountable if nothing is being planned?

"Certainly, a plan is required for cooperative construction, including rural construction" stated the chief of the Department of Housing and Municipal Services of USSR Gosplan N. Bobrovnikov, "Quite possible it should be at the union republic level so as to provide these republics with greater independence in this matter."

But if not for an entire entity, then how can it be planned in detail? Where will the limits and resources come from? Will this not lead to a situation wherein, in the future, only a few of the union republics will plan the construction of cooperative housing in the rural areas while the other republics, just as in the past, will simply observe?

In the opinion of many specialists, no progress will be achieved in the absence of an annual program and special purpose resources for the union.. Knowledge of the overall trajectory of movement will make it possible for the republics and oblasts to coordinate their tactical actions with the overall strategic line of the country's economy in connection with the given problem. And more precisely: when planning the volumes, to employ a well thought out and differentiated approach for each of its regions -- to take into account the availability of manpower, the average level of life-support and the population's annual income, the potential of the production base and contractual construction organizations and the number of those desiring to procure a home using their own money.

"Let us assume for a moment that we have a state plan" stated one of the speakers excitedly, "Thus, do you assume that all villagers will rush to join cooperatives? You are in error! This will not happen. We have already become accustomed to the fact that the state and the farms build homes "free of charge" for the overwhelming majority of people.

It is agreed then that not everybody is in support of the plan. The problem of organizing cooperative-housing construction in the rural areas is a multi-tiered one. And, if you please, one of the most difficult tasks, especially during the initial stage, is that of overcoming the settled consumer psychology of some people.

"A requirement exists for constant explanatory work regarding the advantages of cooperative housing construction and the privileges which the state extends to a builder" it was stated at Uskolkhozstroy, "

"We received a great amount of assistance from television, movies and the press and also from mobile exhibits of plans for farmstead type homes."

One did not have to wait long for the results. Today the Uzbek SSR occupies first place in the country with regard to the placing in operation of rural cooperative homes. Only at Uzskolkhozstroy -- the leading organization for cooperative construction in the rural areas, for fulfilling the function of the only general contractor and client for construction and planning -- the 733d ZhSK has been created. It numbers more than 13,000 families. Two thirds of them are already living in well organized cottages. Approximately 1,800 more homes are in the process of being built and for 3,000 families planning is being carried out, tracts of land are being set aside and financing arranged. Within the republic, success has been achieved in reaching a proper proportion for cooperative and state construction. Last year alone, within the Uzskolkhozstroy system, it amounted to 54 and 46 percent respectively. The plans call for approximately 400,000 square meters of cooperative housing space to be placed in operation by the end of the five-year plan. This is two times more than last year.

Rather paradoxically, the successes achieved by Uzskolkhozstroy and the prospects for growth clearly conflict with the opinion which persists in various circles that it is unprofitable for contractual organizations to engage in cooperative housing.

However, more information will be provided on this subject in the next issue.

#### Use of Shallow Footings Approved

Moscow STROITEL'NAYA GAZETA in Russian 18 Mar 83 p 3

[Article by V. Dumnyy, engineer at Rosorgtekhsel'stroy and V. Sazhin, candidate of technical sciences at TsNIIEPSel'stroy: "Is It Always Necessary To Dig Deep?"]

[Text] Recently, special interest has developed in the construction of small agricultural buildings and apartment buildings having only a few stories, in short, light-weight installations on heaving soils involving the use of shallow footings. What is the explanation for this?

N. Frolov, foreman  
Vologda Oblast



In conformity with the normative documents, the depth for the embedding of footings in heaving soils must be not less than the freezing depth of such soil. It is obvious that this increases considerably the cost of construction. It bears mentioning that in regions characterized by deep freezing of the soil the cost for the footings of single-story buildings constitutes from 30 to 50 percent of the overall expenses for construction. Naturally, one particular question arises: "How can the cost of the footings be lowered while at the same time retaining their reliability?"

A solution was found in the use of shallow footings, installed in the zone of seasonal freezing of soil. This became possible owing to a basically new approach for planning them, based upon a computation for heaving deformations.

The plans call for methods for reducing the effects of irregular foundation deformations on building structures. In particular, continuous footings under the walls of brick and panel buildings erected on medium and severely-heaving soils are combined into a sturdy horizontal framework which redistributes the irregular formation deformations caused by heaving during the soil freezing period and also by contraction -- during the thawing period. The principle of increasing the sturdiness and joint operation of footings is retained during the installation of shallow columnar footings.

The depth for the embedding and reinforcing of footings is determined by a computation carried out in conformity with the "Manual on the Planning of Shallow Footings on Heaving Soils," developed by TsNIIEPSel'stroy jointly with NIIOSP /Scientific Research Institute of Foundations and Underground Structures/ of USSR Gosstroy. This document was approved by the NTS /Scientific and Technical Council of USSR Gosstroy and also by USSR Minsel'stroy /Ministry of Rural Construction/, for use in experimental construction.

Commencing in 1978, the Kalugasel'stroy Trust erected many brick production buildings and garages for agricultural equipment on shallow continuous footings. The placement depth for the footings was 50-60 centimeters instead of 160. The expenditure of concrete for installing the footings was reduced by 60-70 percent and their cost decreased by more than a factor of 2.5.

In Yaroslavl Oblast, footings are being installed under homes of the farmstead type using a single series of concrete blocks instead of three as called for in the plan. For the construction of panel homes in Kalinin Oblast, use was made of shallow columnar footings of the sheath type. In terms of their supporting capability, they are in no way inferior to complete-unit columnar footings; this was checked experimentally.

At the present time, the organizations of USSR Minsel'stroy, Roskolkhozstroy-ob"yedineniye, USSR Ministroy /Ministry of Construction/ and USSR Minlesbumprom /Ministry of the Lumber and Paper Industries/ have built approximately 300 buildings having only a few stories and of various types on shallow footings. The economic savings has amounted to more than 500,000 rubles.

Compared to footings installed lower than the freezing depth, shallow footings have the following average indicators of effectiveness per square meter

of building space: reduced expenditures 7.1 rubles, labor expenditures 0.6 man-days, expenditure of concrete 0.13 cubic meters, cement 18.3 kilograms and conventional fuel 18.2 kilograms. Observations carried out on the buildings revealed that during the winter they were subjected to considerably heaving and yet they resumed their original position following thawing of the soil. Irregular deformations of the foundations did not cause any damage to the structures.

The positive experience accumulated in the shallow embedding of footings was approved. However, it bears mentioning that this experience was obtained mainly in the European part of the country, in regions where the depth of soil freezing is less than 2 meters. Thus the plans call for extensive experimental construction of installations on shallow foundations in regions characterized by deeper freezing of the soil. A summary of the results of such work will be used in the preparation of an appropriate normative document.

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## CONSTRUCTION MACHINERY AND EQUIPMENT

### MAJOR PROBLEMS IN AUTOMATING CONSTRUCTION EXAMINED

Moscow PRAVDA in Russian 10 May 83 p 2

[Article by V. Vorob'yev, N. Danilov and V. Ogiyevich, doctors of technical sciences and professors: "Will Automated Machinery Arrive at the Job Site? Problems and Opinions"]

[Text] An automated plant has already been operating in L'vov for a long time producing 200,000 cubic meters of concrete per year. Its design was worked out by specialists in the Central Scientific Research and Experimental Design Institute for Organization, Mechanization and Technical Assistance for Construction (TsNIIOMTP) with the participation of specialists in Kiev, L'vov and Kremenchug. New general purpose continuous cyclical technology using automated belt batch measuring devices and programmed control was made the basis of the design. In comparison with other plants of equal productivity the cost of capital construction here was reduced by 10 percent, the area for the construction site by 45 percent, the total volume of the buildings and structures by 64 percent and the power of the electric motors that were installed by 60 percent. Among related enterprises these are records for labor productivity, savings of electrical power per cubic meter of product and for reducing other expenses. Unfortunately, this innovation is still not being extensively adopted.

Concrete and mortar plants, installations and centers are the primary "shops" at each construction site. In 1980 the total amount of concrete and mortar mixtures produced amounted to 245 million cubic meters and it will increase even more during the current five-year plan. And, therefore, savings of funds, labor, materials, electricity, and heat here has great importance.

While continuously operating concrete mixing installations that have been developed at home are on a sufficiently technical level one cannot say that about the automated cyclical processes of preparing concrete mixtures that are being adopted most extensively in our country.

The level of complete automation is still unjustifiably low. Controlling production through the use of microprocessors and small EVMs [computers] is practically not being adopted.

Not so long ago during an inspection of about 500 enterprises in various ministries and departments it became clear that at the majority of plants and installations the number of workers was substantially higher than that specified by the designs and that labor productivity was lower than the norm by a factor of two and even three. Mixing and batch measuring departments and warehouses are huddled together in poor

facilities and materials get dirty and mixed together. By completely automating the enterprises and bringing the output up to the design indicators about 60,000 people could be freed.

Typical designs for automated concrete mixing plants and centers were already proposed long ago. However, a multitude of institutes and organizations in various ministries and departments are turning out individual designs with indicators that are much worse than for the typical ones. The "relative proportion" of such enterprises amounts to 25 to 35 percent for the leading construction ministries and up to 90 percent for the Ministry of Agricultural Construction.

The control systems and means of automation for the concrete mixing plants and centers that are being turned out also leave much to be desired. An SUBZ [expansion unknown] type of control system can "command" only the batch measuring and mixing department while the overhead hopper department and cement and admixture warehouses remain outside its sphere of activity.

More than that the control systems for the warehouses are morally outmoded and cannot be linked to the control systems of the batch measuring and mixing departments due to a difference in the primary bases and, therefore, the enterprises cannot work under automated conditions. The majority of construction organizations does not have services that would gear up, operate and repair the means of automation. One cannot but be surprised that concrete and mortar plants and centers are often operated manually and, in the best case--by remote control. This results in an increase in the number of personnel, a reduction in the quality of the concrete mixtures and mortars, an overconsumption of cement and a worsening of working conditions.

The production processes that are done directly at the construction sites are being automated extremely slowly. Even the possibilities that exist for this are poorly used. For example, the use of automated systems for controlling earth moving and transporting machines and road construction machines (autogriders, scrapers and asphalt layers) has been obtained by construction sites. Their fleet already comprised about 35,000 machines by 1981. However, due to improper operation and the poor organization of technical service and repair they do not operate at full capacity. The proportion of operating autogriders with "Profile 1, 10, 20" automated systems has not exceeded 6 percent, scrapers with a "stabilizing plan" system have not exceeded 12 percent and asphalt layers with a "stabilizing layer" system have not exceeded 11 percent.

The average annual economic effect from the use of one of these machines based on data from VNII [All-Union Scientific Research Institute] for Road Construction Machinery is estimated at approximately 7,000 rubles.

The possible savings from the full use of the entire fleet would amount to about 250 million rubles but has actually proved to be one tenth of that.

Automated governors for the load lifting capacity of various types of cranes and modifications that are important for safe work are extensively used at construction sites. However, a substantial portion of these mechanisms are not very safe even though the annual output of them has reached 35,000 units. The new 25, 40 and 63

ton hydraulic cranes are not at all sufficiently equipped with automated governors for the load lifting capacity. The structural form of these mechanisms requires improvement for which it is important to study the expertise that has already been accumulated. For example, the governor that was developed in the Dagestan Polytechnical Institute distinguishes itself favorably from others with automated retuning devices during a change in the working conditions of the cranes. It is desirable that the structural designers of these mechanisms take only the best ones.

Or let's take various safety devices--devices that signal about the impermissible approach of cranes to electric transmission lines, inclinometers and others. Unfortunately, the production of testing units for adjusting them and uncovering defects has not been developed. For many years they have been designing cranes with radio and radio programmed control and construction machines with remote control; however, practical results have somehow not been seen.

Certain automated mechanisms and devices are turned out in small series or are manufactured by parties with little experience. This is in regard, for example, to a mechanism that adjusts piles to be vertical. As to decking, finishing, painting, roofing and a number of other operations the level of automation is generally low here.

Automation is one of the foundations of scientific and technical progress in construction as well. What, then, is holding it back?

The reasons are many. But the most important one, perhaps, is the lack of coordination between the construction ministries, their scientific organizations and experimental production. Where powerful specialized NIIs [Scientific Research Institutes] and structural bureaus for automation have been formed in industry only departments and laboratories have been formed in construction and the majority have little power and they are few in number. They often have no experimental and testing bases and thematics are often duplicated. The lack of departmental coordination and interdepartmental "rivalry" seriously complicates the selection and objective evaluation of the mechanisms that have been created. The numerous attempts at coordinating the automation work, which have been attempted by the Department for Mechanizing Construction in USSR Gosstroy, have up to now proved to have had little effect.

Due to this a number of long-range systems and means of automation have for years not been able to be adopted in practice. Numbered among them are mechanisms for measuring and compensating for the moisture in admixtures, all-purpose batch measuring devices without levers having belt-type uninterrupted cyclical operation, programmed control systems for production processes, mechanisms for determining the density of soil, and others.

It is obvious that to improve matters centralization, conducting a uniform scientific and technical policy and a systematic approach are needed. With this aim an extensive program to completely automate the processes for various types of construction (industrial, civil, power, transport, agricultural and others) should be set and begun to be implemented without delay. The efforts of the organizations that are working in the area of automating construction production including research subdivisions in colleges must also be better coordinated and native and foreign advanced know how must be correlated and more extensively used.

In 1976 the question of forming scientific production associations with the provisional name "Stroyavtomatika" was placed before USSR Gosstroy in the form of an initiative. It was proposed that scientific research, experimental, and structural design work be concentrated at it and that experimental production, services for adopting innovations and other services be attached to it--everything that is necessary to initiate the results of new developments.

Such an organization of affairs is characteristic of the largest firms in the world that are engaged in the automation and mechanization of construction and has long ago proved its effectiveness. However, these proposals did not receive support at USSR Gosstroy.

Later USSR Gosstroy approved TsNIIOMTP as the chief institute for the automation of construction production. Previously there had been an automation department in this institute comprised of several laboratories (about 30 people). However, in 1978 it was reduced to one laboratory with a subsequent decrease in the number of people over the years: 18, 12 and in 1981--8 people. A USSR Gosstroy commission that inspected the institute in 1981 pointed out this unjustified and inexpedient reduction. And yet according to the new structure for TsNIIOMTP that was approved by USSR Gosstroy in 1982 this independent subdivision was totally eliminated. Similar changes are going on in the NII for Organizing Construction Production in UkSSR Gosstroy. The number of workers in the automation laboratory here was reduced from 35 to 10 people.

Construction ministries also give little attention to automation problems. As a matter of fact no one is specifically and purposefully occupied with these problems in them. Why not reorganize the main administrations for mechanization into chief administrations for complete automation and mechanization after staffing them with the appropriate specialists? It would also be expedient to have subdivisions in the lower levels of construction as well that would be responsible for adopting and competently utilizing means and systems of automation.

The sector also is in need of specialists that are well acquainted with such systems and mechanisms. Training for engineers with the appropriate background and also specialists with a secondary technical education and highly qualified workers in PTU [professional and technical schools] for the service, gearing up and repair of means of automation must be expanded.

Important and difficult tasks stand before the multimillion army of workers during the 11th Five-Year Plan which were spoken about at the November (1982) Plenum of the CPSU Central Committee. Automation is a good helper in solving them. It awaits the most concerned attention of USSR Gosstroy, construction ministries and scientific organizations.

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## BUILDING MATERIALS

### UZBEK MINISTRY DRAGS FEET ON LIGHTWEIGHT AGGREGATE DEVELOPMENT

Moscow STROITEL'NAYA GAZETA in Russian 30 Jan 83 p 3

/Article by A. Kuzanov, chief of the Administration for Scientific Research Work and New Equipment of Gosstroy for the Uzbek SSR and Candidate of Technical Sciences: "An Unnecessary Burden?"

/Text The construction volumes in Uzbekistan are increasing with each passing year. Accordingly, increases are taking place in the requirements for lightweight aggregate for buildings of various types and floor levels. But there is a clear breakdown here: the proportion of light weight structures, items and parts, compared to the overall volume of precast reinforced concrete produced in 1982, amounted to only 10 percent. In this sector of the construction industry, Uzbekistan is noticeably inferior to its neighbors -- Kazakhstan, Turkmenia and Kirghizia. It is also worthy of note that for the country as a whole the mentioned indicator is 24.5 percent.

Ten percent! Even though the republic has been generously endowed by nature with a good raw materials base. According to the most humble estimates by the Ministry of Geology for the Uzbek SSR, the supplies of raw materials for the production of porous aggregate at seven quarries alone are sufficient for 60 years. In addition there are the waste products of the Angren GRES /state regional electric power plant and the Fergana TETs /heat and electric power plant, which operate on coal. More than 10 million cubic meters of ash and slag have already accumulated in the dumping grounds, which are fully suitable for the production of these materials.

It bears mentioning that the use of construction structures and parts made out of light aggregate lowers the weight of buildings and installations by up to 30 percent and this is very important for our seismic region. Thought should be given to this and other well known advantages of lightweight products in connection with the fact that the modernization and technical re-equipping of 20 large-panel housing construction enterprises and the erection of new ones -- two in Tashkent and one in Almalyk -- are being carried out in the republic.

Unfortunately, despite the obvious advantages, the production of light aggregates for all practical purposes is not being developed. The annual requirement for porous clay filler amounts to more than 3 million cubic meters. The amount produced last year was 2.5 times less than this figure. The

production is dispersed among many departments, only 60-70 percent of the planned capabilities is being used and the quality is low. The organizations of some ministries and departments compensate for the shortage in porous aggregate by importing it from outside Uzbekistan and yet this is very expensive.

The desire to put an end to departmental isolation has dictated the need for preparing a special purpose program for developing the production of light aggregates during the 11th Five-Year Plan. Obviously, all of the construction ministries and departments, the Academy of Sciences and a number of planning and scientific-research institutes have been attracted to participating in this work.

It should be emphasized that a great amount of research work preceded the preparation of this program. Its implementation promises to raise the technical level for procuring raw materials, lower considerably the production costs and the wholesale factory prices for the products, raise their quality, produce annual savings of 50,000 tons of cement, 20,000 tons of metal and large quantities of fuel and electric power and solve a number of other tasks.

Two years have passed and for all practical purposes only the initial steps have been undertaken. The raw materials base has been defined and a basically new production technology has been developed which takes into account the specific properties of the local raw materials. Tashniistromproyekt has begun preparing plans. And that's it.

The fault lies in the fact that there is no single leading organization in Uzbekistan in whose hands is concentrated the production of porous aggregates and which could establish uniform technical policies. In our case, almost all of the construction ministries and departments, in addition to the republic's Minstroyaterialy [Ministry of Construction Materials], engage in this work. Incredible but true.

A type of vicious circle has been created: in accordance with a work order by USSR Gosplan, the construction ministries and departments are not assigned resources directly for the development of a porous aggregate base. And what about the republic's Ministry of Construction Materials Industry? It clearly does not wish to assume an unnecessary burden, it does not require resources and it does not display initiative.

Frankly speaking, it is not easy to break up the circle. Today the managers are not likely to part with their enterprises. Yet they must be modernized and improved. This should be done using funds for the development of production or bank credits. And new enterprises should be built only by order of Minstroyaterialy and only for it. All of the quarry establishments should be turned over to it so as to release the ministries and departments from functions not normally associated with them. In our opinion, this represents the minimum program.

Obviously Gosplan, the republic's Council of Ministers and the USSR Ministry of Construction Materials Industry will have an important contribution to make concerning its implementation.

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